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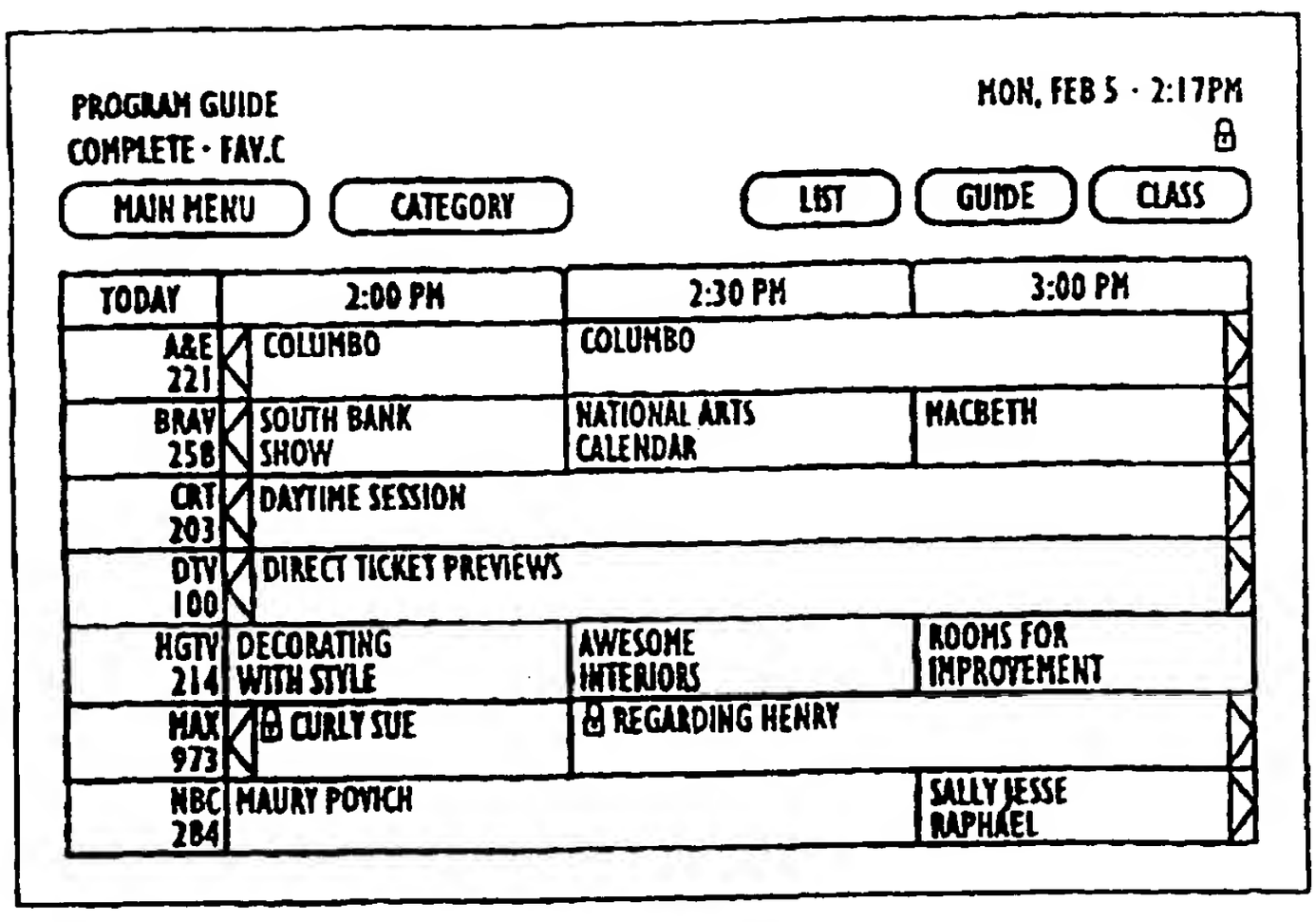

(57) Abstract

A terminal device (10) for use with a receiver (11) having a display screen. The terminal device having means for receiving a signal containing program source information and program event information for a plurality of program sources (i.e., the program guide), memory means coupled to the receiving means for storing the program guide, display means for outputting the program guide to the display screen and a system controller coupled to the memory means and the display means. The system controller functions to control the transfer of the program guide between the memory means and the display means such that the plurality of program sources are listed in alphabetical order in the program guide.

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METHOD AND APPARATUS FOR SORTING CHANNEL GUIDES BASED ON CALL SIGN

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a subscription television system, and more particularly, to a method and apparatus for sorting channel guides based on the call sign of the various channels.

2. Description of the Prior Art

As the subscription television industry has grown, providers of subscription television continually offer more and more channels to the individual subscriber. Typical systems offer more than 100 different channels. Such systems also typically display a channel or program guide, which identifies all available channels and the programs currently airing and upcoming programs on the associated channel.

In known systems, for example, the system described in U.S. Patent No. 5,353,121, which is herein incorporated by reference, the channel guide is sorted by channel number. In other words, channel no. 1 and the associated program is listed first in the guide, then channel no. 2 is listed, and so on. However, each subscription television provider is responsible for assigning a given channel (e.g., 1, 2, 3, etc.) to a program source (e.g., TNN, MTV, CNN, etc.). As such, the channel number corresponding to a given program source varies from provider to provider.

Thus, a substantial problem arises for the individual subscriber in that the subscriber may have to scan over 100 channels in the program guide in order to locate the desired program source (e.g., ABC). Due to the numerous channels available, this searching can require a considerable amount of time. Furthermore, even once the desired channel is initially located, it becomes a significant mental challenge to recall the

numerical designations associated with the numerous program sources of interest, without returning and scanning through the program guide once again.

Accordingly, there exists a need for a program guide which allows the subscriber to readily locate the desired program source without the need for scanning the entire program guide.

SUMMARY OF THE INVENTION

The present invention provides a program guide which satisfies the aforementioned needs. Specifically, the present invention provides a program guide which lists the available program sources in alphabetical order.

The present invention relates generally to a terminal device for use with a receiver having a display screen. The terminal device comprises means for receiving a signal containing program source information and program event information for a plurality of program sources (i.e., the program guide), memory means coupled to the receiving means for storing the program guide, display means for outputting the program guide to the display screen and a system controller coupled to the memory means and the display means. The system controller functions to control the transfer of the program guide between the memory means and the display means such that the plurality of program sources are listed in alphabetical order in the program guide.

The present invention also relates to a method of generating a program guide. The method comprises receiving a signal containing program source information and program event information for a plurality of program sources, decoding the signal so as to identify each program source and the corresponding program event information for each program source, and displaying the program source information and corresponding program event information for each of the plurality of program sources on the display screen such that the plurality of program

sources are listed in alphabetical order.

As described in detail below, the method and apparatus of the present invention provide important advantages. Most importantly, the present invention eliminates the need for the subscriber or viewer to scan over the entire range of available channels in order to locate a desired program source. Furthermore, the present invention eliminates the need for the subscriber to memorize the numerical designation (which may change from system to system) associated with a given program source.

The invention itself, together with further objects and attendant advantages, will best be understood by reference to the following detailed description, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a functional block diagram of one embodiment of the terminal device of the present invention.

Fig. 2 illustrates an exemplary program guide produced in accordance with the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Fig. 1 is a functional block diagram of one embodiment of the terminal device 10 of the present invention. As shown in Fig. 1, the terminal device 10 includes receiving means 11 comprising tuner 12, demodulator 13 and FEC decoder 14. The receiving means 11 is controlled by microprocessor 15, and operates to receive a signal which includes program guide, and video and audio information for all channels available on the given system.

In the embodiment of Fig. 1, an antenna 8 and low noise filter 9 function to receive the signal from a satellite source and to couple the signal to the receiving means 11 of the

terminal device 10. However, it is noted that the present invention is not limited to system providers which utilize satellite transmissions to broadcast signals. The novel system of the present invention could be readily used with system providers who supply signals via, for example, cable or telephone lines.

Upon receipt of the signal, tuner 12 functions to downconvert the received signal to an intermediate frequency ("IF"). The IF signal is then converted to a digital equivalent by the demodulator 13 and coupled to decoder 14, which provides forward error correction on the received signal.

Apparatus 10 also comprises a transport chip 11. The transport chip 11 preferably comprises a channel demultiplexer 16, a decryption unit 17 and an access card interface 18. The output of the decoder 14 is coupled to the channel demultiplexer 16, which functions to separate the audio and video information of each channel, and also separates the program guide information. Under control of the microprocessor 15, the channel demultiplexer 16 provides at its output port, the audio and video information of a selected channel or the program guide information.

Transport chip 11 further comprises an access card reader 19 which is coupled to the decryption unit 17 and the access card interface 18. The access card interface 18 operates in conjunction with the decryption unit 17 and the access card reader 19 to provide a means of preventing, for example, unauthorized pay-per-view movies from being ordered by children.

Apparatus 10 further comprises a modem 31 which allows the microprocessor 15 to be coupled to, for example, the public telephone network. The apparatus also includes microprocessor peripherals 33, such as serial and/or parallel data ports, and a power supply 35 for supplying power.

In the satellite system illustrated in Fig. 1, multiple

transponders located in a satellite (not shown) are utilized to transmit channel information (e.g., audio, video) to the terminal device 10. Each transponder transmits information regarding multiple channels (i.e., multiple program sources, such as ABC, CBS, etc.). However, each transponder also transmits the program guide for every channel provided by the system provider on one of the frequencies available within the given transponder.

As such, regardless of which transponder the tuner 12 is tuned to, the program guide is available at the output of the channel demultiplexer 16. Under control of the microprocessor 15, the program guide is stored in random access memory ("RAM") 20, which is coupled to the channel demultiplexer 16. The system RAM 20 also functions to buffer the digital data associated with the audio and video data of a given channel.

The microprocessor 15 operates to periodically update the program guide stored in the system RAM 20. In the present embodiment, the program guide is updated one of two ways. First, the microprocessor 15 periodically analyzes the program guide transmitted by the provider to determine if the program guide has been updated. This can be accomplished, for example, by utilizing a flag bit which indicates that the program guide has been modified. If the program guide has been modified, the microprocessor 15 stores the updated guide in the system RAM 20. Second, as an independent process, the microprocessor 15 monitors an expiration date/time transmitted along with the program guide. Upon reaching the expiration date/time, the microprocessor 15 updates the program guide stored in system RAM 20 with the program guide currently being transmitted.

Returning to Fig. 1, the terminal device of the present invention further comprises a MPEG chip 22, for example, Part No. 64002, manufactured by LSI Logic. The MPEG chip 22 comprises a video decoder and on screen display generator 24, and an audio decoder 25. The MPEG chip 22 functions to decompress the audio

and video data output by the channel demultiplexer 16, which is transmitted by the provider in a compressed format. The NTSC encoder 26 and audio subsystem 27 format the decompressed audio and video data, respectively, for display on, for example, a television receiver. The output drivers 28 function to transmit the audio and video information of a selected channel to the display screen of the television receiver.

In the event the subscriber selects to display the program guide, which can be accomplished by selecting the predefined channel associated with the program guide, via front panel 30 or a remote control (not shown), the microprocessor 15 retrieves the program guide from system RAM 20, and then accesses a font table stored in memory. The microprocessor 15 then converts the program guide stored in memory 20 into a displayable font data. The displayable font data is then coupled to the MPEG chip 22. As described above, the MPEG chip 22 in combination with NTSC encoder 26 and the output drivers 28, functions to write the program guide to the television receiver at the start of the next available frame.

Importantly, when providing the displayable font information to the MPEG chip 22, the microprocessor 15 arranges the program guide such that the program source information (e.g., ABC, TNN, CNN, etc.) is displayed on the television receiver in alphabetical order.

Fig. 2 illustrates an exemplary program guide produced in accordance with the present invention. As shown in Fig. 2, the program guide is presented in alphabetical order based on program source (i.e., call sign). The terminal device of the present embodiment is capable of displaying approximately seven program sources and the corresponding programs at a single time. As shown in Fig. 2, the program source and the programs being shown thereon are displayed on a single line comprising multiple cells of varying length. The first cell indicates the program source

and the channel number assigned to the source. In the present embodiment, the program sources are listed alphabetically from top to bottom. However, the reverse is also possible. In order to view additional program information, the subscriber simply presses, for example, a page down key or a scroll key, on the remote control (i.e., scroll down key) and the foregoing process is repeated for the new program data to be displayed.

The alphabetical ordering of the program source information can be accomplished in numerous ways. For example, prior to initially storing the program guide in system RAM 20, the microprocessor 15 can be programmed to analyze and identify all program sources contained within the program guide, and thereafter store the program guide in system memory 20 in an alphabetical order based on program source. As such, when subsequently transferring data to the MPEG chip 22, the microprocessor 15 need only transfer program guide entries stored in the system RAM 20 in a sequential fashion in order to maintain and present the program sources in an alphabetical order.

Alternatively, the microprocessor 15 can be commanded to alphabetize the program guide on the basis of program source subsequent to the program guide initially being stored in system RAM 20. This can be accomplished by indexing the program guide stored in memory. Specifically, once stored, each program source is identified and indexed so as create an alphabetical ordering of the program sources. Indexing the program sources can entail, for example, providing pointers to each program source such that upon generation of the guide by accessing the pointers, the guide is generated in alphabetical order. Of course other methods of generating the alphabetical ordering is possible.

The two foregoing methods of generating a program guide which displays the program sources in alphabetical order are only exemplary of the numerous methods available. In the present embodiment of the terminal device 10, it should be remembered

that the program guide must be supplied to the MPEG chip 22 in the order to be displayed. It is also understood that various methods are available for mapping the program source information with the corresponding program event information in memory 20.

The method and apparatus of the present invention provides important advantages. Most importantly, the present invention eliminates the need for the subscriber or viewer to scan over the entire range of available channels in order to locate a desired program source. Furthermore, the present invention eliminates the need for the subscriber to memorize the numerical designation (which changes from system to system) associated with a given program source.

Of course, it should be understood that a wide range of changes and modifications can be made to the preferred embodiment described above. It is therefore intended that the foregoing detailed description be regarded as illustrative rather than limiting and that it be understood that it is the following claims, including all equivalents, which are intended to define the scope of the invention.

WHAT IS CLAIMED IS:

1. A method of generating a program guide, said method comprising the steps of:

receiving a signal comprising program source information and program event information for a plurality of program sources,

decoding said signal so as to identify each program source and the corresponding program event information for each program source, and

displaying said program guide comprising said program source information and corresponding program event information for each of said plurality of sources on said display screen,

said plurality of program sources being listed in alphabetical order.

2. The method of generating a program guide according to claim 1, wherein said program source and the corresponding program event information for each program source is stored in memory.

3. The method of generating a program guide according to claim 2, wherein a system controller controls the transfer of said program source information and corresponding program event information for each program source from said memory to said display screen.

4. The method of generating a program guide according to claim 1, wherein said program guide displayed on said display screen comprises at least two program sources and corresponding event information.

5. The method of generating a program guide according to claim 1, wherein said signal is transmitted from a provider via a satellite.

6. A terminal device for use with a receiver having a display screen, said terminal device comprising:

means for receiving a signal, said signal containing program source information and program event information for a plurality of program sources;

memory means coupled to said receiving means, said program source information and program event information for a plurality of program sources being stored in said memory means;

display means for outputting said program guide comprising said program source information and corresponding program event information for each of said plurality of program sources to said display screen so as to form a program guide; and

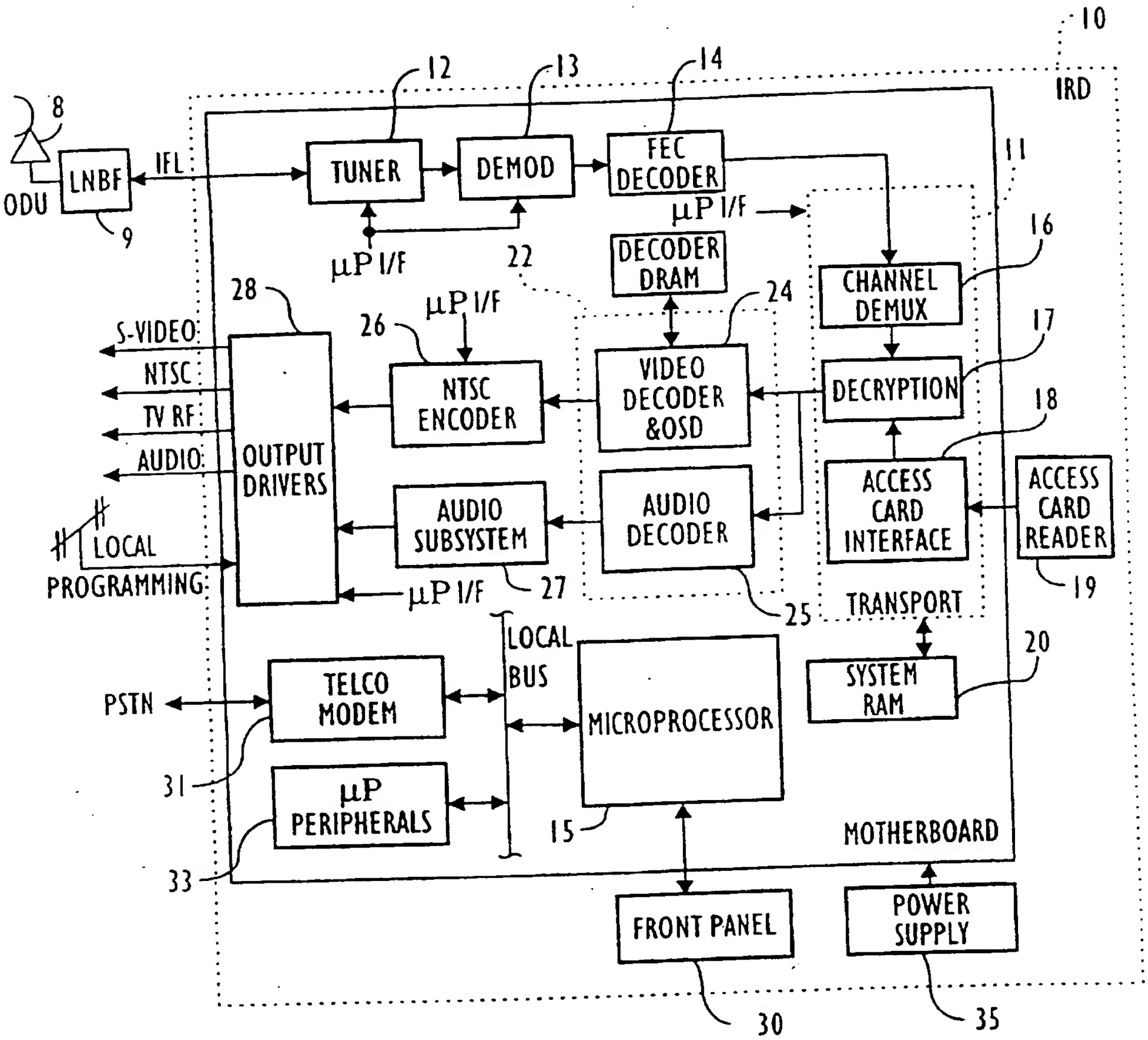
a system controller coupled to said memory means and said display means, said system controller operative for controlling the transfer of said program source information and corresponding program event information for each of said plurality of program sources between said memory means and said display means such that said plurality of program sources are listed in alphabetical order in said program guide.

7. The terminal device according to claim 6, wherein said program source information and corresponding program event information for each of said plurality of program sources is stored in said memory means in alphabetical order of the program sources.

8. The terminal device according to claim 6, wherein said program guide displayed on said display screen comprises at least two program sources and corresponding event information.

9. The terminal device according to claim 6, wherein said signal is transmitted from a provider to said receiver via a satellite.

10. The terminal device according to claim 6, wherein said system controller is a microprocessor.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DECODER DRAM
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CHANNEL DEMUX
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µP I/F
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17
S-VIDEO
NTSC
TV RF
AUDIO
OUTPUT DRIVERS
NTSC ENCODER
VIDEO DECODER &OSD
DECRYPTION
18
ACCESS CARD INTERFACE
ACCESS CARD READER
19
AUDIO SUBSYSTEM
AUDIO DECODER
LOCAL PROGRAMMING
µP I/F
27
25
TRANSPORT
LOCAL BUS
20
SYSTEM RAM
PSTN
TELCO MODEM
MICROPROCESSOR
31
µP PERIPHERALS
15
MOTHERBOARD
33
FRONT PANEL
POWER SUPPLY
30
35

FIG. 1

PROGRAM GUIDE
COMPLETE · FAV.C

MON, FEB 5 · 2:17PM

MAIN MENU | CATEGORY | LIST | GUIDE | CLASS

TODAY	2:00 PM	2:30 PM	3:00 PM
A&E 221	COLUMBO	COLUMBO	
BRAV 258	SOUTH BANK SHOW	NATIONAL ARTS CALENDAR	MACBETH
CRT 203	DAYTIME SESSION		
DTV 100	DIRECT TICKET PREVIEWS		
HGTV 214	DECORATING WITH STYLE	AWESOME INTERIORS	ROOMS FOR IMPROVEMENT
MAX 973	CURLY SUE	REGARDING HENRY	
NBC 284	MAURY POVICH		SALLY JESSE RAPHAEL

FIG. 2

INTERNATIONAL SEARCH REPORT

Inter .onal Application No
PCT/US 97/02420

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/16 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	EP 0 391 656 A (THOMSON CONSUMER ELECTRONICS) 10 October 1990	1,6
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A	PATENT ABSTRACTS OF JAPAN vol. 014, no. 219 (P-1045), 9 May 1990 & JP 02 050725 A (NEC CORP), 20 February 1990, see abstract	1,6,7

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
30 April 1997	10.06.97

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Information on patent family members

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 97/02420

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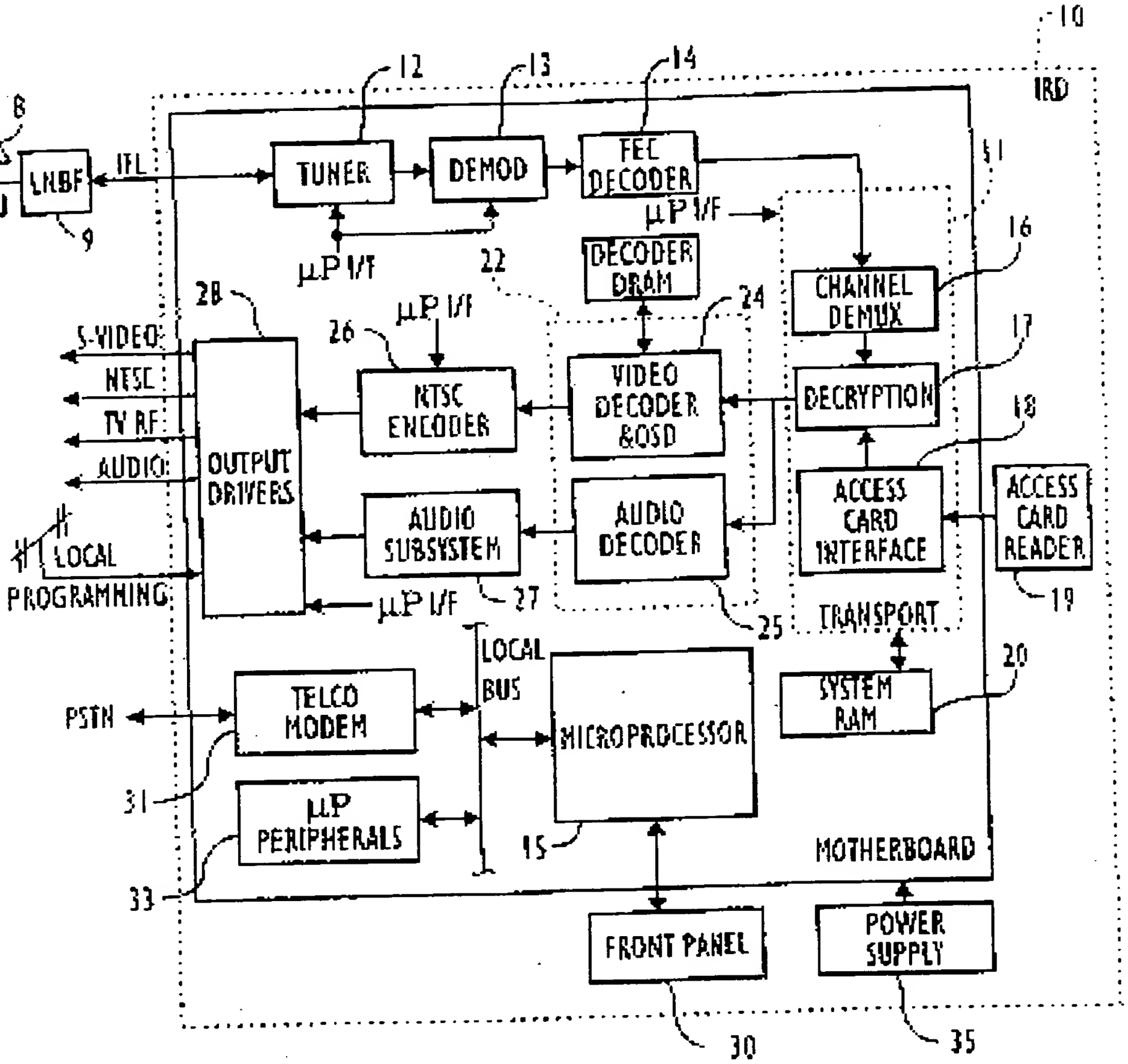
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DEMOD
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µP I/F
DECODER DRAM
16
CHANNEL DEMUX
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µP I/F
24
17
S-VIDEO
NTSC
TV RF
AUDIO
OUTPUT DRIVERS
NTSC ENCODER
VIDEO DECODER &OSD
DECRYPTION
18
AUDIO SUBSYSTEM
AUDIO DECODER
ACCESS CARD INTERFACE
ACCESS CARD READER
LOCAL PROGRAMMING
µP I/F
27
25
TRANSPORT
19
LOCAL BUS
PSTN
TELCO MODEM
MICROPROCESSOR
SYSTEM RAM
20
31
µP PERIPHERALS
15
MOTHERBOARD
33
FRONT PANEL
POWER SUPPLY
30
35

FIG. 1

ABC 221	[illegible]		
BRAV 258	SOUTH BANK SHOW	NATIONAL ARTS CALENDAR	MACBETH
CRJ 203	DAYTIME SESSION		
DTV 100	DIRECT TICKET PREVIEWS		
HGTV 214	DECORATING WITH STYLE	AWESOME INTERIORS	ROOMS FOR IMPROVEMENT
NAK 973	CURLY SUE	REGARDING HENRY	
NBC 284	MAURY POVICH		SALLY JESSE RAPHAEL

FIG. 2